claiming that at times the ergastoplasm formed around, and sometimes encircled, the nucleus. He suggested that the nuclear sap or chromatic substance from the nucleolus passed through the nuclear membrane and joined with the ergastoplasm. Garnier's proposal was further developed by Prenant (1898), the supervisor of Garnier's thesis, who termed the ergastoplasm *protoplasme supérieur* and characterized it as a zone of the cytoplasm that could differentiate into other structures.

As with the mitochondrion, investigators disagreed as to whether the ergastoplasm was a real structure. Regaud offered support for Garnier and Prenant, showing that when he added acetic acid to his fixative, the ergastoplasm appeared as Garnier reported but mitochondria were not visible, whereas if he left out the acetic acid, mitochondria appeared, but no ergastoplasm (Regaud, 1909). He also supported the idea that ergastoplasm involved cytoplasmic material which was "impregnated with chromatin or a closely related substance" (quoted in Haguenau, 1958). In opposition, Morelle (1927) denied that the ergastoplasm had a fibrillar structure and proposed that it was simply modified ground cytoplasm which, due to its chemical composition, took up basic stains. Christian Champy (1911) proposed that ergastoplasm was simply poorly fixed mitochondria.

Although, as Haguenau describes, there continued to be some publications describing the ergastoplasm, it largely faded from view in characterizations of cell structures in the first half of the twentieth century. It is not discussed, for example, either in Cowdry's *General cytology* (1924) or in Bourne's *Cytology and cell physiology* (1942).

The Golgi Apparatus (1900–1940)

What came to be known as the *Golgi apparatus* was first systematically observed in Purkinje and ventral horn cells of the barn owl and the cat by Camillo Golgi in 1898. He fixed his cells with an osmium-tetroxide-potassium dichromate mixture followed by impregnation with silver salts (Golgi, 1898). To Golgi it appeared as a fine network, which he characterized as an internal reticular apparatus (*apparato reticulare interno*; see Figure 3.5). A number of other investigators in the same period also described what was probably the same structure. Whaley provides an explanation as to why Golgi's work stands out:

> Considering the fixatives and stains being used, the amount of experimental work with them characteristic of the latter part of the 19th century, and the multiplicity of the tissue and cell types being studied, it seems reasonable to suggest that a considerable number of investigators may have seen this pleiomorphic